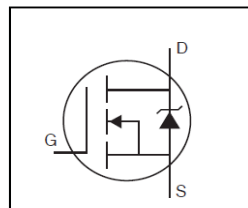


## 特性

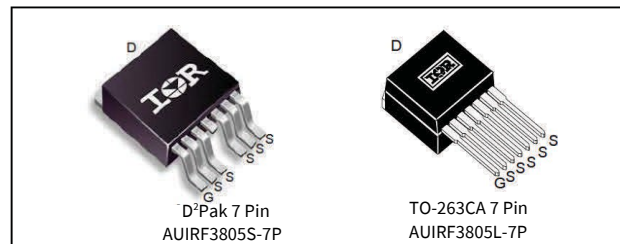
- 先进工艺技术
- 超低导通电阻
- 工作温度 175°C
- 快速开关
- 允许达到  $T_{jmax}$  的重复雪崩
- 无铅，符合 RoHS 要求
- 汽车认证 \*

## 描述

这款 HEXFET® 功率 MOSFET 专为汽车应用而设计，采用最新的工艺技术实现单位硅面积极低的导通电阻。该设计的特点包括 175°C 工作结温、开关速度快和提高重复雪崩额定值。通过结合以上特点，使该设计成为一种极其高效和可靠的器件，可用于汽车应用和各种其他应用。



|                   |         |
|-------------------|---------|
| $V_{DS}$          | 55V     |
| $R_{DS(on)}$ typ. | 2.0mΩ   |
| max.              | 2.6mΩ ⑦ |
| $I_D$             | 240A    |



|      |       |        |
|------|-------|--------|
| G    | D     | S      |
| Gate | Drain | Source |

| Base Part Number | Package Type | Standard Pack      |          | Complete Part Number |
|------------------|--------------|--------------------|----------|----------------------|
|                  |              | Form               | Quantity |                      |
| AUIRF3805L-7P    | TO-263-7PIN  | Tube               | 50       | AUIRF3805L-7P        |
| AUIRF3805S-7P    | D²Pak-7PIN   | Tube               | 50       | AUIRF3805S-7P        |
|                  |              | Tape and Reel Left | 800      | AUIRF3805S-7TRL      |

## 绝对最大额定值

超过“绝对最大额定值”所列值的应力可能会对器件造成永久性损坏。这些仅仅是应力额定值，并不意味着器件在这些或任何其他超过该规范所示的条件下能够正常运行。延长暴露在绝对最大额定值条件的时间可能会影响器件的可靠性。热阻抗和功率耗散额定值是在装板和静止空气条件下测得的。环境温度 ( $T_A$ ) 为 25°C，除非另有规定。

| Symbol                            | Parameter                                                  | Max.                  | Units |
|-----------------------------------|------------------------------------------------------------|-----------------------|-------|
| $I_D$ @ $T_C = 25^\circ\text{C}$  | Continuous Drain Current, $V_{GS}$ @ 10V                   | 240                   | A     |
| $I_D$ @ $T_C = 100^\circ\text{C}$ | Continuous Drain Current, $V_{GS}$ @ 10V                   | 170                   |       |
| $I_D$ @ $T_C = 25^\circ\text{C}$  | Continuous Drain Current, $V_{GS}$ @ 10V (Package Limited) | 160                   |       |
| $I_{DM}$                          | Pulsed Drain Current ①                                     | 1000                  |       |
| $P_D$ @ $T_C = 25^\circ\text{C}$  | Maximum Power Dissipation                                  | 300                   | W     |
|                                   | Linear Derating Factor                                     | 2.0                   | W/°C  |
| $V_{GS}$                          | Gate-to-Source Voltage                                     | ± 20                  | V     |
| $E_{AS}$                          | Single Pulse Avalanche Energy (Thermally Limited) ⑧        | 440                   | mJ    |
| $E_{AS (tested)}$                 | Single Pulse Avalanche Energy Tested Value ②               | 680                   |       |
| $I_{AR}$                          | Avalanche Current ①                                        | See Fig.12a,12b,15,16 | A     |
| $E_{AR}$                          | Repetitive Avalanche Energy ①                              |                       | mJ    |
| $dv/dt$                           | Peak Diode Recovery ③                                      | 2.3                   | V/ns  |
| $T_J$                             | Operating Junction and                                     | -55 to + 175          | °C    |
| $T_{STG}$                         | Storage Temperature Range                                  |                       |       |
|                                   | Soldering Temperature, for 10 seconds (1.6mm from case)    | 300                   |       |

## 热阻抗

| Symbol          | Parameter                                       | Typ. | Max. | Units |
|-----------------|-------------------------------------------------|------|------|-------|
| $R_{\theta JC}$ | Junction-to-Case ⑥                              | ---  | 0.50 | °C/W  |
| $R_{\theta CS}$ | Case-to-Sink, Flat, Greased Surface             | 0.50 | ---  |       |
| $R_{\theta JA}$ | Junction-to-Ambient                             | ---  | 62   |       |
| $R_{\theta JA}$ | Junction-to-Ambient (PCB Mount, steady state) ⑤ | ---  | 40   |       |

HEXFET® 是英飞凌的注册商标。

\*认证标准可在 [www.infineon.com](http://www.infineon.com) 上找到

本数据手册的原文使用英文撰写。为方便起见，英飞凌提供了译文；由于翻译过程中可能使用了自动化工具，英飞凌不保证译文的准确性。为确认准确性，请务必访问 [infineon.com](http://infineon.com) 参考最新的英文版本（控制文档）。

**静态电气特性@T<sub>J</sub> = 25°C (除非另有说明)**

| Symbol                                 | Parameter                            | Min. | Typ. | Max. | Units | Conditions                                                          |
|----------------------------------------|--------------------------------------|------|------|------|-------|---------------------------------------------------------------------|
| V <sub>(BR)DSS</sub>                   | Drain-to-Source Breakdown Voltage    | 55   | ---  | ---  | V     | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA                        |
| ΔV <sub>(BR)DSS</sub> /ΔT <sub>J</sub> | Breakdown Voltage Temp. Coefficient  | ---  | 0.05 | ---  | V/°C  | Reference to 25°C, I <sub>D</sub> = 1.0mA                           |
| R <sub>DS(on)</sub> SMD                | Static Drain-to-Source On-Resistance | ---  | 2.0  | 2.6  | mΩ    | V <sub>GS</sub> = 10V, I <sub>D</sub> = 140A ③                      |
| V <sub>GS(th)</sub>                    | Gate Threshold Voltage               | 2.0  | ---  | 4.0  | V     | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA          |
| g <sub>fs</sub>                        | Forward Transconductance             | 110  | ---  | ---  | S     | V <sub>DS</sub> = 25V, I <sub>D</sub> = 140A                        |
| I <sub>DSS</sub>                       | Drain-to-Source Leakage Current      | ---  | ---  | 20   | μA    | V <sub>DS</sub> = 55V, V <sub>GS</sub> = 0V                         |
|                                        |                                      | ---  | ---  | 250  |       | V <sub>DS</sub> = 55V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 125°C |
| I <sub>GSS</sub>                       | Gate-to-Source Forward Leakage       | ---  | ---  | 200  | nA    | V <sub>GS</sub> = 20V                                               |
|                                        | Gate-to-Source Reverse Leakage       | ---  | ---  | -200 |       | V <sub>GS</sub> = -20V                                              |

**动态电气特性在 T<sub>J</sub> = 25°C时测得 (除非另有规定)**

| Symbol                | Parameter                       | Min. | Typ. | Max. | Units | Conditions                                                         |
|-----------------------|---------------------------------|------|------|------|-------|--------------------------------------------------------------------|
| Q <sub>g</sub>        | Total Gate Charge               | ---  | 130  | 200  | nC    | I <sub>D</sub> = 140A V <sub>DS</sub> = 44V                        |
| Q <sub>gs</sub>       | Gate-to-Source Charge           | ---  | 53   | ---  |       | V <sub>GS</sub> = 10V ③                                            |
| Q <sub>gd</sub>       | Gate-to-Drain ("Miller") Charge | ---  | 49   | ---  |       |                                                                    |
| t <sub>d(on)</sub>    | Turn-On Delay Time              | ---  | 23   | ---  | ns    | V <sub>DD</sub> = 28V I <sub>D</sub> = 140A R <sub>G</sub> = 2.4Ω  |
| t <sub>r</sub>        | Rise Time                       | ---  | 130  | ---  |       | V <sub>GS</sub> = 10V ③                                            |
| t <sub>d(off)</sub>   | Turn-Off Delay Time             | ---  | 80   | ---  |       |                                                                    |
| t <sub>f</sub>        | Fall Time                       | ---  | 52   | ---  |       |                                                                    |
| L <sub>D</sub>        | Internal Drain Inductance       | ---  | 4.5  | ---  | nH    | Between lead, 6mm (0.25in.) from package and center of die contact |
| L <sub>S</sub>        | Internal Source Inductance      | ---  | 7.5  | ---  |       |                                                                    |
| C <sub>iss</sub>      | Input Capacitance               | ---  | 7820 | ---  | pF    | V <sub>GS</sub> = 0V V <sub>DS</sub> = 25V                         |
| C <sub>oss</sub>      | Output Capacitance              | ---  | 1260 | ---  |       | f = 1.0 MHz, See Fig. 5                                            |
| C <sub>rss</sub>      | Reverse Transfer Capacitance    | ---  | 610  | ---  |       | V <sub>GS</sub> = 0V, V <sub>DS</sub> = 1.0V, f = 1.0MHz           |
| C <sub>oss</sub>      | Output Capacitance              | ---  | 4310 | ---  |       | V <sub>GS</sub> = 0V, V <sub>DS</sub> = 44V, f = 1.0MHz            |
| C <sub>oss eff.</sub> | Effective Output Capacitance ④  | ---  | 1540 | ---  |       | V <sub>GS</sub> = 0V, V <sub>DS</sub> = 0V to 44V                  |

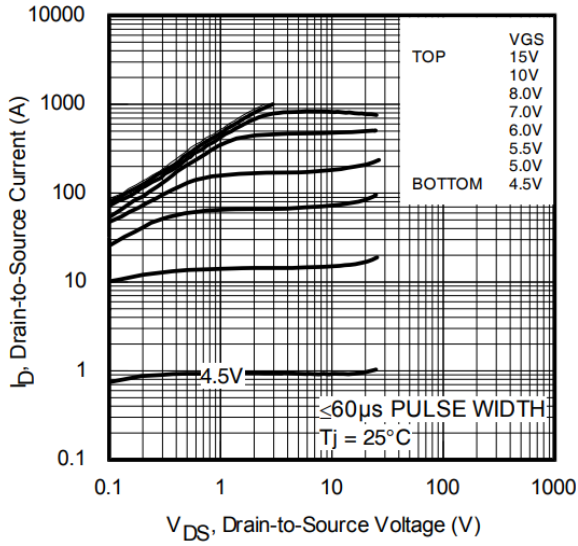
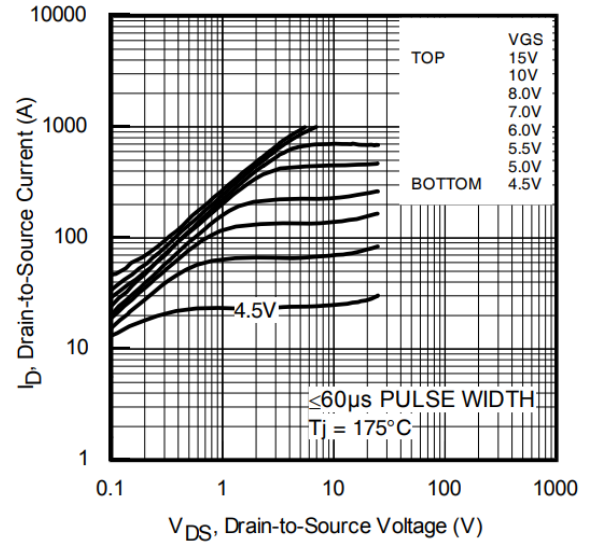
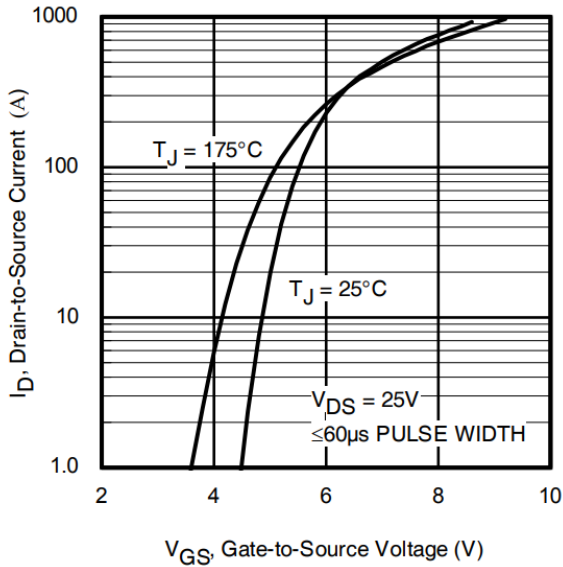
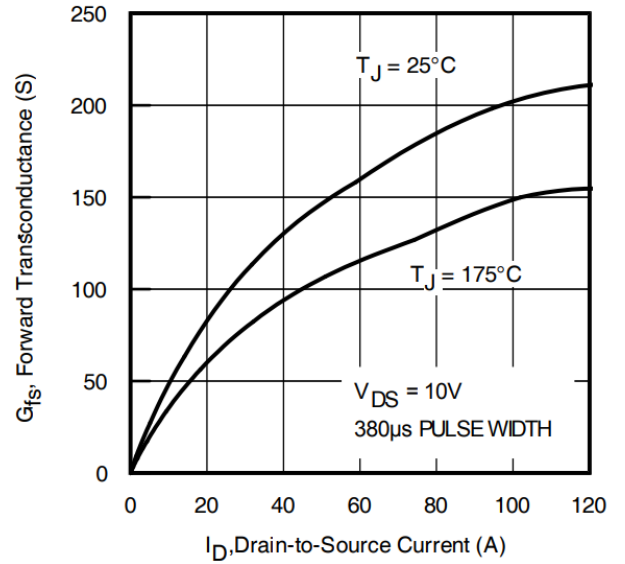
**二极管特性**

| Symbol          | Parameter                              | Min.                                                                                           | Typ. | Max. | Units | Conditions                                                           |
|-----------------|----------------------------------------|------------------------------------------------------------------------------------------------|------|------|-------|----------------------------------------------------------------------|
| I <sub>S</sub>  | Continuous Source Current (Body Diode) | ---                                                                                            | ---  | 240  | A     | MOSFET symbol showing the integral reverse p-n junction diode.       |
| I <sub>SM</sub> | Pulsed Source Current (Body Diode) ②   | ---                                                                                            | ---  | 1000 |       |                                                                      |
| V <sub>SD</sub> | Diode Forward Voltage                  | ---                                                                                            | ---  | 1.3  | V     | T <sub>J</sub> = 25°C, I <sub>S</sub> = 140A, V <sub>GS</sub> = 0V ③ |
| t <sub>rr</sub> | Reverse Recovery Time                  | ---                                                                                            | 45   | 68   | ns    | T <sub>J</sub> = 25°C, I <sub>F</sub> = 140A, V <sub>DD</sub> = 28V  |
| Q <sub>rr</sub> | Reverse Recovery Charge                | ---                                                                                            | 35   | 53   | nC    | di/dt = 100A/μs ③                                                    |
| t <sub>on</sub> | Forward Turn-On Time                   | Intrinsic turn-on time is negligible (turn-on is dominated by L <sub>S</sub> +L <sub>D</sub> ) |      |      |       |                                                                      |

**注:**

- ① 重复额定值; 脉冲宽度受最高结温限制。(见图11)
- ② 该值由样片故障总数决定, 初始结温为 T<sub>J</sub> = 25°C, L = 0.043mH, R<sub>G</sub> = 25Ω, I<sub>AS</sub> = 140A, V<sub>GS</sub> = 10V。
- ③ 脉冲宽度 ≤ 1.0ms; 占空比 ≤ 2%。
- ④ C<sub>oss eff.</sub> 是一个固定电容值, 当 V<sub>DS</sub> 从 0 上升至 80% V<sub>DSS</sub> 时, 其充电时间与 C<sub>oss</sub> 相同。
- ⑤ 这适用于安装在 1 平方英寸 PCB (FR-4 或 G-10 材料) 上的 D<sup>2</sup>Pak。有关推荐的footprint和焊接技术, 请参阅应用手册 #AN-994

- ⑥ R<sub>θ</sub> 在 T<sub>J</sub> 约为 90°C 时测得。
- ⑦ 焊料安装在 IMS 基板上。
- ⑧ 受 T<sub>Jmax</sub> 限制, 起始 T<sub>J</sub> = 25°C, L = 0.043mH, R<sub>G</sub> = 25Ω, I<sub>AS</sub> = 140A, V<sub>GS</sub> = 10V。不建议在高于此值的情况运行器件。


**图 1**典型输出特性

**图 2**典型输出特性

**图 3**典型转移特性

**图 4**典型正向跨导与漏极电流关系曲线

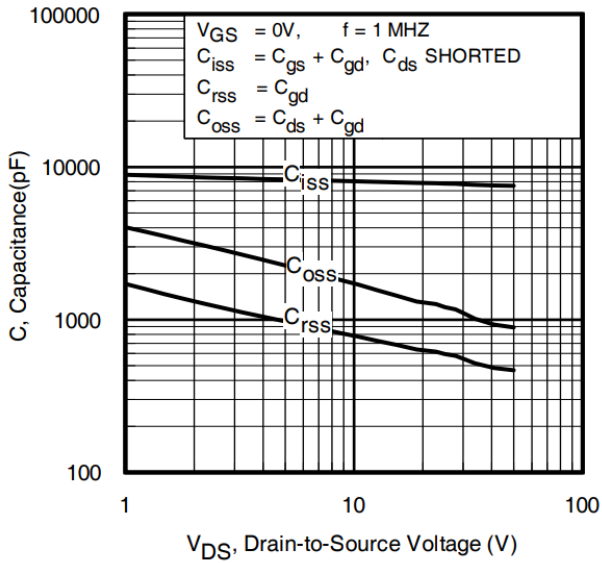


图 5.典型电容与漏源电压关系  
曲线

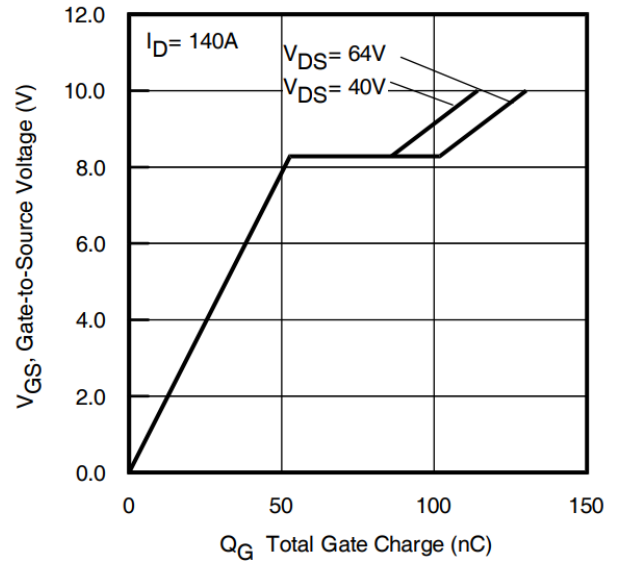


图 6.典型栅极电荷与栅源电压  
关系曲线

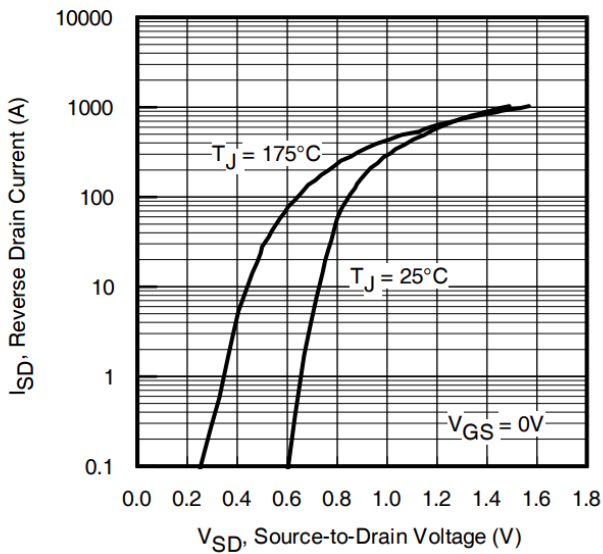


图 7典型源漏二极管正向电压

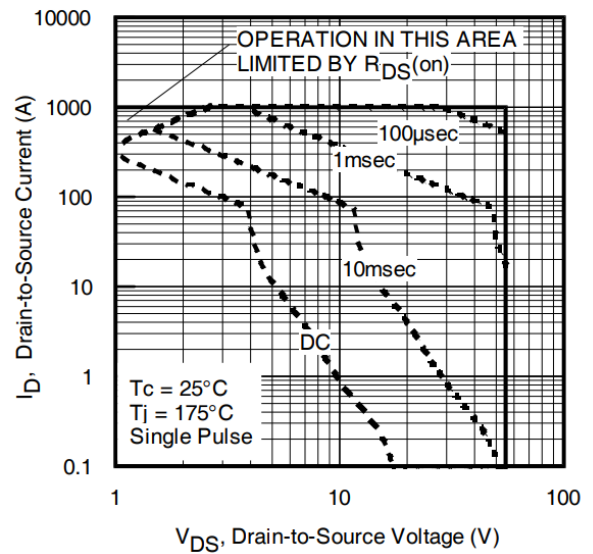


图 8.最大安全工作区

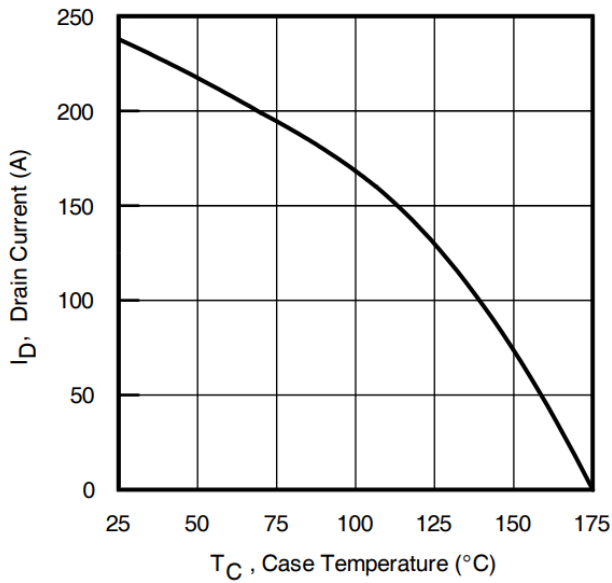


图 9.最大漏极电流与壳温

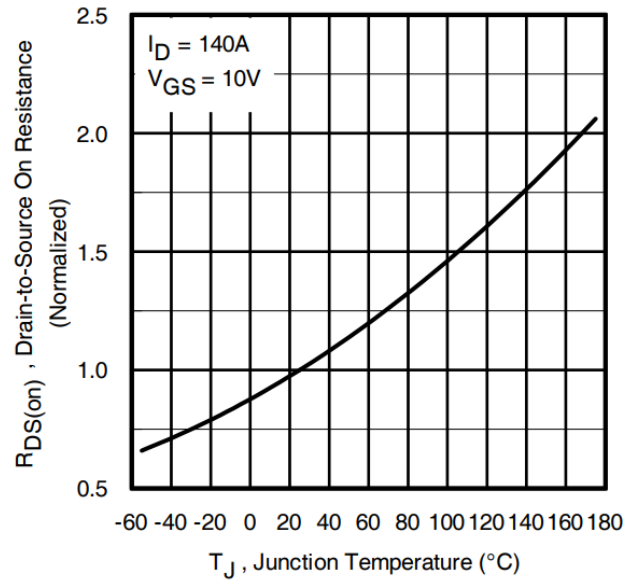


图 10.归一化导通电阻与温度的关系曲线

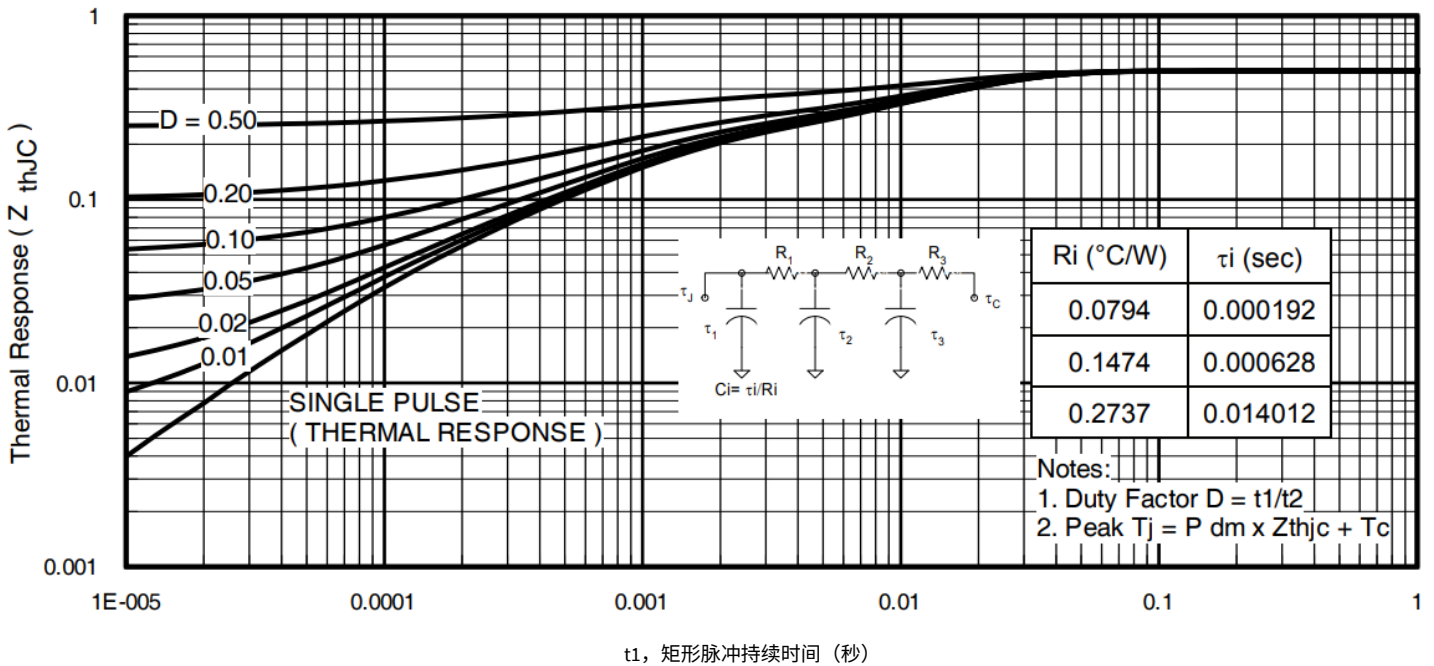


图 11.最大有效瞬态热阻，结到壳

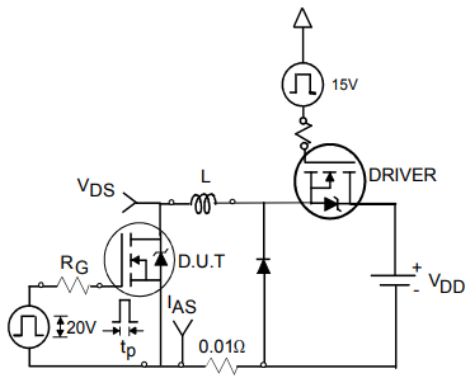


Fig 12a. Unclamped Inductive Test Circuit

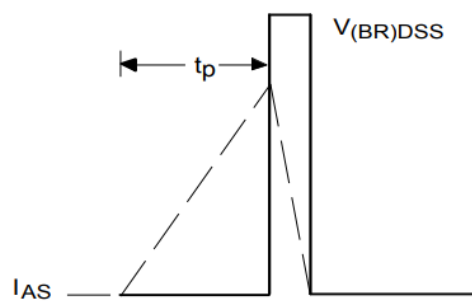


Fig 12b. Unclamped Inductive Waveforms

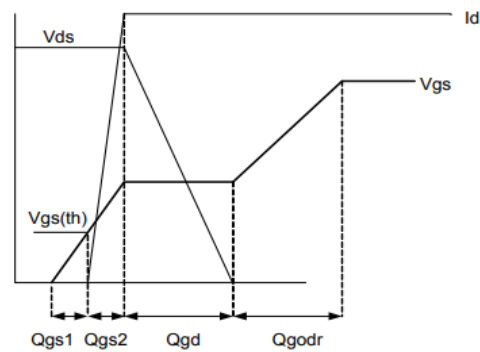


Fig 13a. Basic Gate Charge Waveform

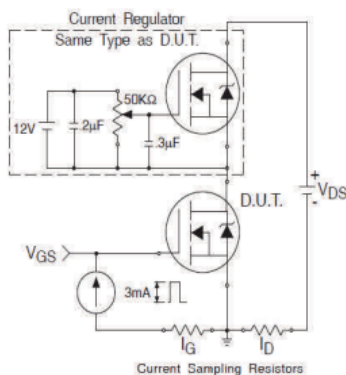


Fig 13b. Gate Charge Test Circuit

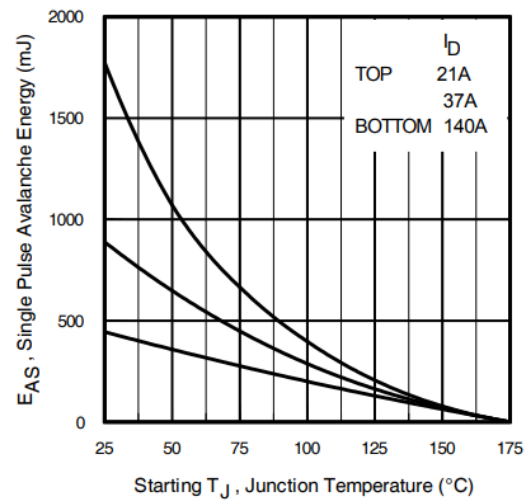


Fig 12c. Maximum Avalanche Energy

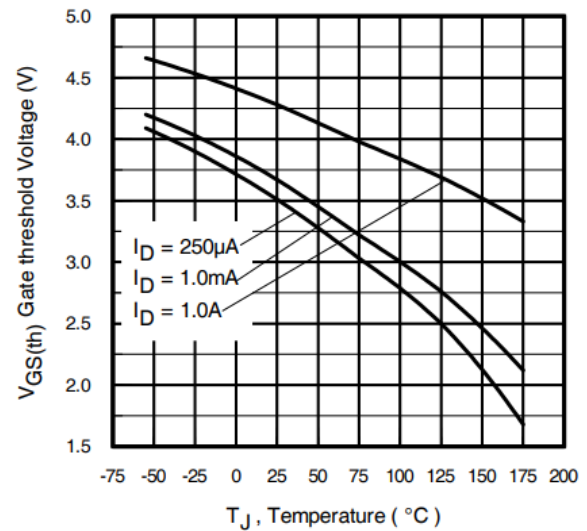


Fig 14. Threshold Voltage vs. Temperature

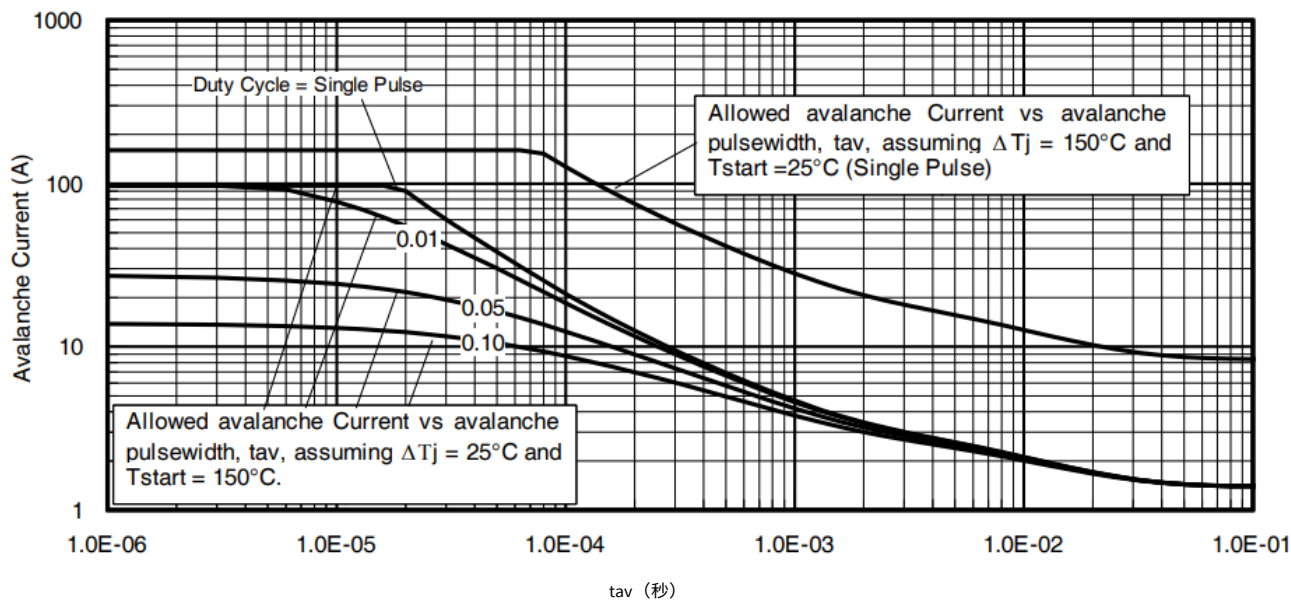


图 15.典型雪崩电流与脉冲宽度

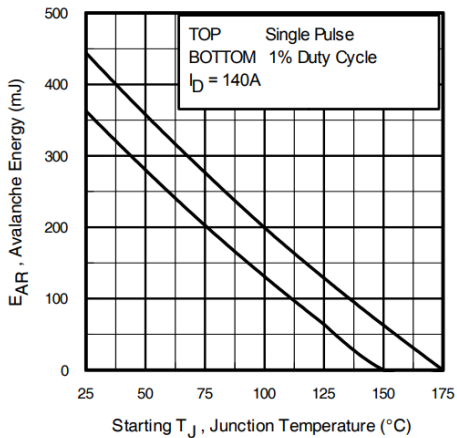


图 16.最大雪崩能量与温度的关系曲线

关于重复的雪崩曲线的注释，图 15、16：（更多信息，请参见[www.irf.com](http://www.irf.com) 上的 AN-1005）

1. 雪崩失效假设：  
纯粹的热现象和失效发生在结温远超  $T_{jmax}$  的情况下。这对每种零件类型都是有效的。
2. 只要不超过  $T_{jmax}$ ，就可以在雪崩中安全运行。
3. 如下公式基于图 12a、12b 所示的电路和波形。
4.  $PD(ave)$  = 每个雪崩脉冲的平均功率耗散。
5.  $BV$  = 额定击穿电压（1.3 倍系数，考虑雪崩期间的电压增加）。
6.  $I_{av}$  = 可允许的雪崩电流。
7.  $\Delta T$  = 可允许的结温上升，不得超过  $T_{jmax}$ （图 15、16 中假设为 25°C）。  
 $t_{av}$  = 雪崩的平均时间。  
 $D$  = 雪崩占空比 =  $t_{av} \cdot f$   
 $Z_{thJC}(D, t_{av})$  = 瞬态热阻抗，见图 11)

$$PD(ave) = \frac{1}{2} (1.3 \cdot BV \cdot I_{av}) = \frac{\Delta T}{Z_{thJC} I_{av}} = \frac{2\Delta T}{[1.3 \cdot BV \cdot Z_{th}]} \\ EAS(AR) = PD(ave) \cdot t_{av}$$

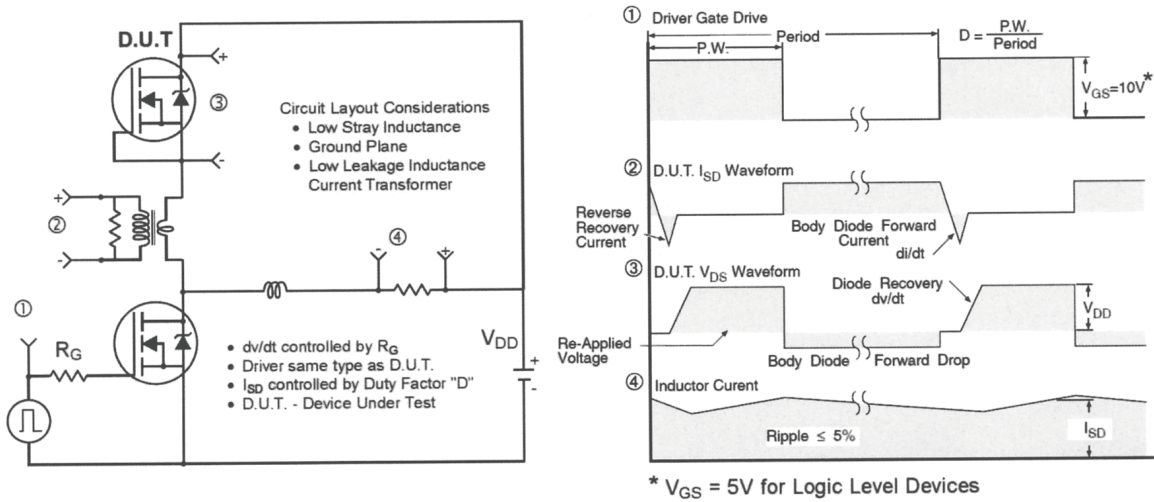


图 17. N 沟道 HEXFET® 功率 MOSFET 体内二极管峰值恢复 dv/dt 测试电路

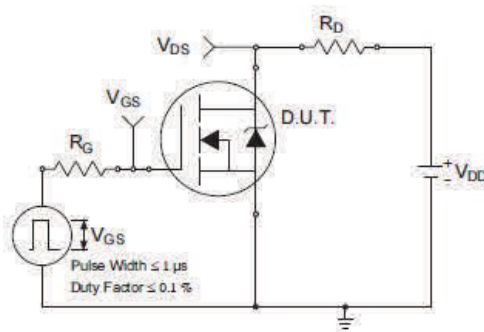


图 18a. 开关时间测试电路

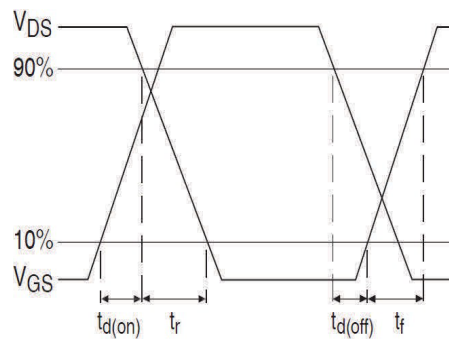
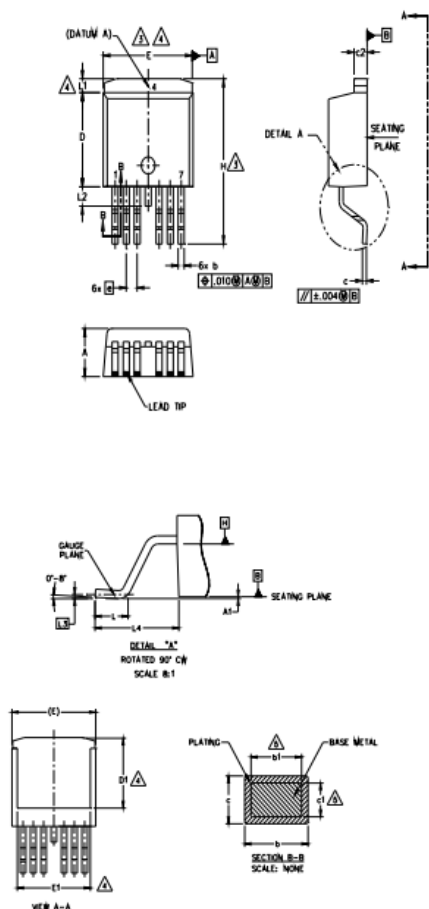


图 18b. 开关时间波形

## D<sup>2</sup>Pak - 7 Pin Package Outline

Dimensions are shown in millimeters (inches)

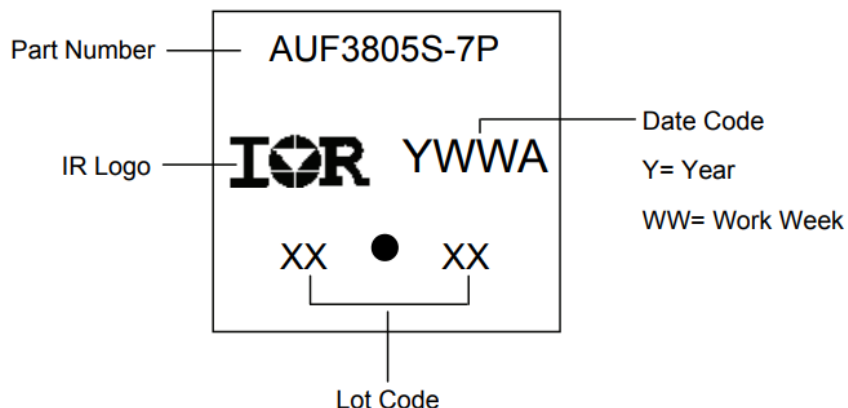


| SYMBOL | DIMENSIONS  |       |          |      | NOTES |
|--------|-------------|-------|----------|------|-------|
|        | MILLIMETERS |       | INCHES   |      |       |
|        | MIN.        | MAX.  | MIN.     | MAX. |       |
| A      | 4.06        | 4.83  | .160     | .190 | 5     |
| A1     | —           | 0.254 | —        | .010 |       |
| b      | 0.51        | 0.99  | .020     | .036 |       |
| b1     | 0.51        | 0.89  | .020     | .032 |       |
| c      | 0.38        | 0.74  | .015     | .029 |       |
| c1     | 0.38        | 0.58  | .015     | .023 | 5     |
| c2     | 1.14        | 1.65  | .045     | .065 | 3     |
| D      | 8.38        | 9.65  | .330     | .380 |       |
| D1     | 6.86        | —     | .270     | —    | 4     |
| E      | 9.65        | 10.67 | .380     | .420 | 3,4   |
| E1     | 6.22        | —     | .245     | —    | 4     |
| e      | 1.27 BSC    |       | .050 BSC |      | 4     |
| H      | 14.61       | 15.88 | .575     | .625 |       |
| L      | 1.78        | 2.79  | .070     | .110 |       |
| L1     | —           | 1.68  | —        | .066 |       |
| L2     | —           | 1.78  | —        | .070 |       |
| L3     | 0.25 BSC    |       | .010 BSC |      | 4     |
| L4     | 4.78        | 5.28  | .188     | .208 |       |

### NOTES:

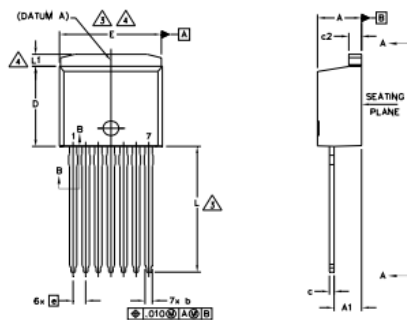
1. DIMENSIONING AND TOLERANCING AS PER ASME Y14.5M-1994
2. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
3. DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.127 [0.005"] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY AT DATUM H.
4. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSION E, L1, D1 & E1.
5. DIMENSION b1 AND c1 APPLY TO BASE METAL ONLY.
6. DATUM A & B TO BE DETERMINED AT DATUM PLANE H.
7. CONTROLLING DIMENSION: INCH.
8. OUTLINE CONFORMS TO JEDEC OUTLINE TO-263CB.

## D<sup>2</sup>Pak - 7 Pin Part Marking Information



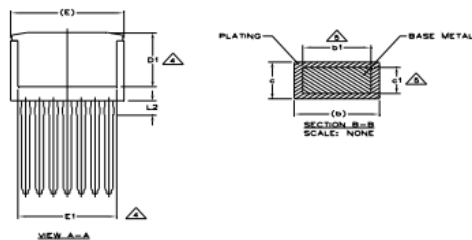
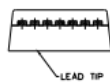
## TO-263CA - 7 Pin Long Leads Package Outline

Dimensions are shown in millimeters (inches)



### NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
2. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
3. DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.127 [0.005"] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY.
4. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSION E, L1, D1 & E1.
5. DIMENSION b1 AND c1 APPLY TO BASE METAL ONLY.
6. CONTROLLING DIMENSION: INCH.
- 7.- OUTLINE CONFORM TO JEDEC TO-263 CA



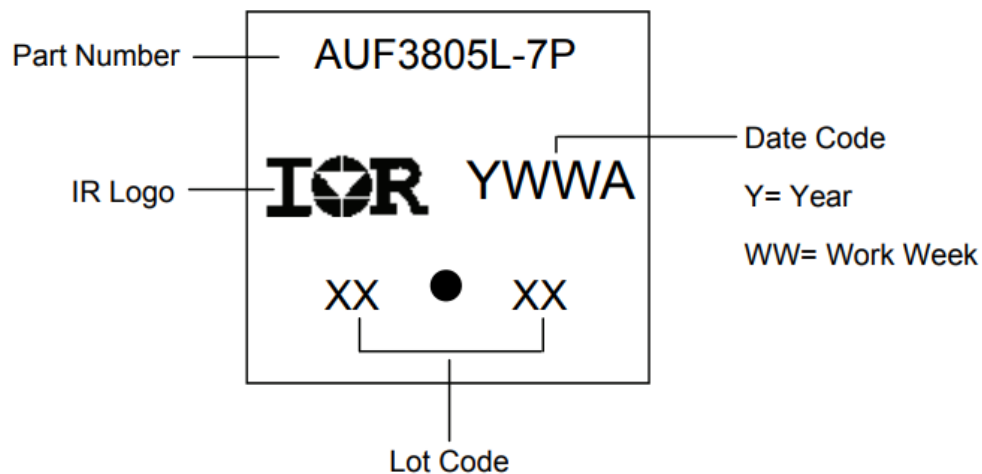
| S<br>Y<br>M<br>B<br>O<br>L | DIMENSIONS  |       |          |      | N<br>O<br>T<br>E<br>S |
|----------------------------|-------------|-------|----------|------|-----------------------|
|                            | MILLIMETERS |       | INCHES   |      |                       |
|                            | MIN.        | MAX.  | MIN.     | MAX. |                       |
| A                          | 4.06        | 4.83  | .160     | .190 | 5                     |
| A1                         | 2.03        | 3.02  | .080     | .119 |                       |
| b                          | 0.51        | 0.91  | .020     | .036 |                       |
| b1                         | 0.51        | 0.81  | .020     | .032 |                       |
| c                          | 0.38        | 0.74  | .015     | .029 | 5                     |
| c1                         | 0.38        | 0.58  | .015     | .023 |                       |
| c2                         | 1.14        | 1.65  | .045     | .065 | 3                     |
| D                          | 8.51        | 9.65  | .335     | .380 |                       |
| D1                         | 6.86        | —     | .270     | —    | 4                     |
| E                          | 9.65        | 10.67 | .380     | .420 | 3,4                   |
| E1                         | 6.22        | —     | .245     | —    | 4                     |
| e                          | 1.27 BSC    |       | .050 BSC |      | 4                     |
| L                          | 13.46       | 14.10 | .530     | .555 |                       |
| L1                         | —           | 1.65  | —        | .065 |                       |
| L2                         | —           | 6.35  | —        | .250 |                       |

### LEAD ASSIGNMENTS

#### HEXFET

- 1.- GATE
- 2.- SOURCE
- 3.- SOURCE
- 4.- DRAIN
- 5.- SOURCE
- 6.- SOURCE
- 7.- SOURCE

## TO-263CA - 7 Pin Part Marking Information

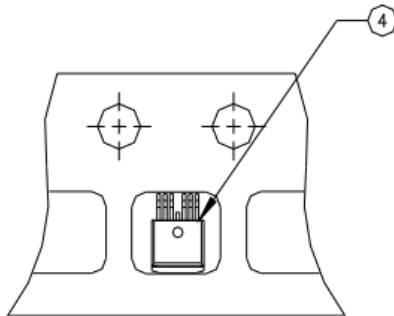


## D2Pak - 7 Pin Tape and Reel

### NOTES, TAPE & REEL, LABELLING:

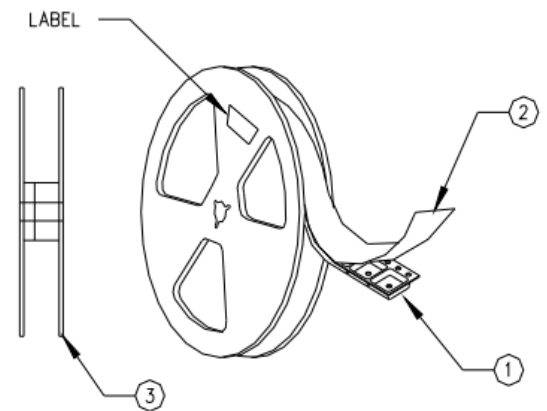
#### 1. TAPE AND REEL.

- 1.1 REEL SIZE 13 INCH DIAMETER.
- 1.2 EACH REEL CONTAINING 800 DEVICES.
- 1.3 THERE SHALL BE A MINIMUM OF 42 SEALED POCKETS CONTAINED IN THE LEADER AND A MINIMUM OF 15 SEALED POCKETS IN THE TRAILER.
- 1.4 PEEL STRENGTH MUST CONFORM TO THE SPEC. NO. 71-9667.
- 1.5 PART ORIENTATION SHALL BE AS SHOWN BELOW.
- 1.6 REEL MAY CONTAIN A MAXIMUM OF TWO UNIQUE LOT CODE/DATE CODE COMBINATIONS. REWORKED REELS MAY CONTAIN A MAXIMUM OF THREE UNIQUE LOT CODE/DATE CODE COMBINATIONS. HOWEVER, THE LOT CODES AND DATE CODES WITH THEIR RESPECTIVE QUANTITIES SHALL APPEAR ON THE BAR CODE LABEL FOR THE AFFECTED REEL.



#### 2. LABELLING (REEL AND SHIPPING BAG).

- 2.1 CUST. PART NUMBER (BAR CODE): IRFXXXXSTRL-7P
- 2.2 CUST. PART NUMBER (TEXT CODE): IRFXXXXSTRL-7P
- 2.3 I.R. PART NUMBER: IRFXXXXSTRL-7P
- 2.4 QUANTITY:
- 2.5 VENDOR CODE: IR
- 2.6 LOT CODE:
- 2.7 DATE CODE:



**Qualification Information**

|                            |                      |                                                                                                                                                                         |             |
|----------------------------|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| <b>Qualification Level</b> |                      | Automotive<br>(per AEC-Q101)                                                                                                                                            |             |
|                            |                      | Comments: This part number(s) passed Automotive qualification. IR's Industrial and Consumer qualification level is granted by extension of the higher Automotive level. |             |
|                            |                      | D <sup>2</sup> PAK 7 Pin                                                                                                                                                | MSL1, 260°C |
| <b>ESD</b>                 | Machine Model        | Class M4(+/-425V) <sup>†</sup><br>(Per AEC-Q101-002)                                                                                                                    |             |
|                            | Human Body Model     | Class H3A(+/-4000V) <sup>†</sup><br>(per AEC-Q101-001)                                                                                                                  |             |
|                            | Charged Device Model | Class C5 (+/-1000V) <sup>†</sup><br>(per AEC-Q101-005)                                                                                                                  |             |
| <b>RoHS Compliant</b>      |                      | Yes                                                                                                                                                                     |             |

† 最高通过电压。

**修订记录**

| Date       | Comments                                                                                                                                  |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| 09/02/2015 | <ul style="list-style-type: none"> <li>Updated data sheet with corporate template.</li> <li>Corrected ordering table on page1.</li> </ul> |
| 09/30/2015 | <ul style="list-style-type: none"> <li>Updated "Infineon" logo all pages.</li> <li>Updated disclaimer on last page</li> </ul>             |
| 10/09/2017 | <ul style="list-style-type: none"> <li>Corrected typo error on part marking on page 9,10.</li> </ul>                                      |

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